Is there any difference in performance efficiency of airports with different ownership structure?

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Structure of the presentation

- Introduction
- Theoretical framework
- Discussion of previous works
- Data
- Empirical analysis
- Further research
- Conclusion

Introduction

- Airport – a set of complex activities -> problem of airport benchmarking
- Airport ownership – public, mixed or private
- Whether privatization helps to improve airport performance or not?

Brief description of the research

- **Purpose:** finding out statistically significant differences in efficiency of airports with different ownership structure
- **Methods used**: DEA, FDH, PFP and FRA
- **Previous works on the topic**: "A comparison of alternative airport performance measurement techniques: A European Case Study" by Vogel and Graham
- **Novelty:** FDH was used to compare airport performance
- **Limitation:** The sample of airports was not the same during the research

Methods used to assess performance

- Partial factor productivity: ratio of input(s) to output(s), financial or physical
- Financial ratio analysis (profitability, asset utilization, operating efficiency)
- Total factor productivity:
- Non-parametric methods

Non-parametric methods

- Many inputs and outputs
- No specific assumptions about the particular form of production function
- DEA vs. FDH: DEA assumes convexity of the production function

Vogel and Graham

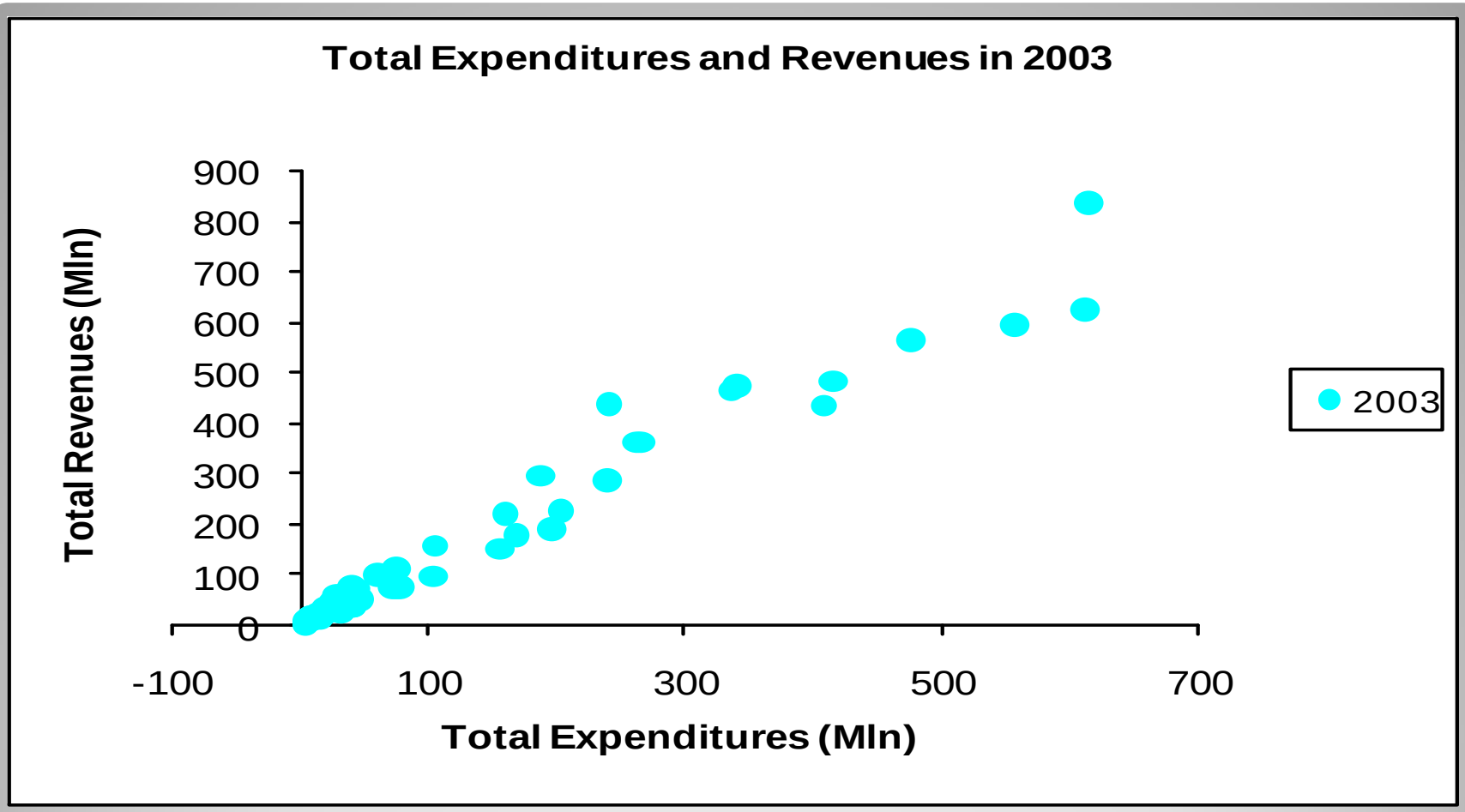
- **Purpose:** comparing performance efficiency of airports with different ownership structure
- **Methods used**: DEA, PFP and FRA
- **Data**:1990-1999, 31 airports and 4 airport systems
- **Limitations:**

- Sample does not remain the same throughout the analysis
- DEA analysis: no test on the significance of differences in scores
- FPF and FRA: countries are not taken into account, partially privatized airports are not considered as a separate group

Data and definitions

- 2000-2004
- 70 airports and airport groups (unchanged ownership of the airport): France -13, Germany – 7, Italy – 17, GB - 23
- Ownership structure:
- Public (>75%) – 43 airports
- Private (<25%) – 17
- Partially privatized (25%≤x≤75%) - 10

Country	Partially Private	Private	Public	Total by country
Austria	1			1
Belgium			1	1
Denmark	1			1
Finland			1	1
France			13	13
GB	1	14	8	23
Germany			7	7
Ireland			1	1
Italy	6	3	8	17
Netherlands			1	1
Norway			1	1
Spain			1	1
Sweden			1	1
Switzerland	1			1
Total	10	17	43	70



Relationship b/w revenues and expenditures

DEA Analysis I

	2000	2001	2002	2003	2004	Total sample
Constant Returns to Scale (CRS) Score	0,5845	0,5573	0,5530	0,5576	0,5620	0,5629
Variable Returns to Scale (VRS) Score	0,6435	0,6111	0,6028	0,6064	0,6132	0,6154
Scale Efficiency Score (VRS over CRS Scores)	0,9169	0,9202	0,9244	0,9261	0,9255	0,9226

	2000	2001	2002	2003	2004	Total sample
Partially Privatized	0,6292	0,5982	0,5822	0,6005	0,6160	0,6052
Private	0,6722	0,6609	0,6513	0,6516	0,6696	0,6611
Public	0,5394	0,5069	0,5073	0,5104	0,5070	0,5142
Total Sample	0,5845	0,5573	0,5530	0,5576	0,5620	0,5629

DEA Analysis II. CRS model

	Private minus Partially Private	Private minus Public	Partially Private minus Public
2000	0,0430	0,1328***	0,0898*
2001	0,0627	0,1540***	0,0914**
2002	0,0692	0,1440***	0,0748**
2003	0,0511	0,1412***	0,0901***
2004	0,0536	0,1626***	0,1090**
Total Sample	**0,0559*** **	**0,1469*** **	**0,0910*** **

DEA analysis III. T-test results for CRS

	Constant Returns to Scale	Variable Returns to Scale
Year 2001	-0,0271	-0,0325
Year 2002	-0,0315*	-0,0407**
Year 2003	-0,2686	-0,0372*
Year 2004	-0,0224	-0,0304
Great Britain	0,0766***	0,0861***
Italy	0,0856***	0,1033***
Fance	-0,0024	0,0009
Other Countries	0,1028***	0,1821***
Constant Term	0,4896***	0,5262***
Totally Privatised	0,1149***	0,1190***
Partially Privatised	0,0473***	0,0621***
Privatised minus Partially Privatised	0,0676***	0,0569***

DEA analysis IV. Country variables

DEA analysis V. Results

- Private airports >partially privatized> public airports
- Vogel and Graham got the same qualitative results

		Year					
	Ownership	**2000**	**2001**	**2002**	**2003**	**2004**	**Total Sample**
Input Oriented Model (IOM)	**Partial privatized**	0,9460	0,9008	0,8625	0,8948	0,8478	0,8904
	Private	0,9304	0,9050	0,8962	0,9059	0,8932	0,9061
	Public	0,7622	0,7331	0,7416	0,7321	0,7125	0,7363
	Average IOM Score	0,8293	0,7988	0,7964	0,7975	0,7757	0,7995
Output Oriented Model (OOM)	**Partial privatized**	0,9161	0,8748	0,8544	0,8349	0,8870	0,8734
	Private	0,8642	0,8720	0,8661	0,8672	0,8979	0,8735
	Public	0,7634	0,7406	0,7430	0,7134	0,7199	0,7361
	Average OOM Score	0,8097	0,7917	0,7888	0,7681	0,7870	0,7891

FDH analysis I

	Private minus Partially Private	Private minus Public	Partially Private minus Public
2000	-0,0155	0,1682***	0,1838***
2001	0,0042	0,1719***	0,1677***
2002	0,0337	0,1546***	0,1210***
2003	0,0111	0,1738***	0,1627***
2004	0,0455	0,1807***	0,1352**
Total Sample	0,0158	0,1698***	0,1541***

FDH analysis II. T-tests, IOM

	Input Oriented Model	Output Oriented Model
Year 2001	-0,0305	-0,0180
Year 2002	-0,0329	-0,0209
Year 2003	-0,0318	-0,0416*
Year 2004	-0,0535**	-0,0227
Great Britain	0,0696***	0,1340***
Italy	0,0753***	0,1507***
France	-0,0407	0,0250
Other Countries	0,1202***	0,1958
Constant Term	0,7318***	0,6643***
Totally Privatised	0,1334***	0,0929***
Partially Privatised	0,1001***	0,0672***
Privatised minus Partially Privatised	0,0334	0,0257

FDH analysis III. Country variables

- FDH is more accurate than DEA if IRS is assumed
- Private airports ≈ Partially privatized > Public airports

FDH analysis IV. Results

3 main fields:

- Operating efficiency:
- Cost per WLU
- Revenue per WLU
- Revenue/Expenditure

- Asset Utilization:
- Total WLU/Total Assets
- Asset turnover

- Profitability
- ROA
- ROCE

PFP and FRA analysis

	2000	2001	2002	2003	2004	Total sample
Partially Privatized	1,34	1,28	1,24	1,28	1,32	1,29
Private	1,44	1,41	1,39	1,39	1,43	1,41
Public	1,15	1,08	1,08	1,09	1,08	1,09
Total Sample	1,25	1,19	1,18	1,19	1,20	1,20

Operating efficiency I. Revenue-expenditure ratio

	Private minus Partially Private	Private minus Public	Partially Private minus Public
2000	0,09	0,29***	0,20*
2001	0,13	0,33***	0,20**
2002	0,15	0,31***	0,16**
2003	0,11	0,31***	0,20**
2004	0,11	0,36***	0,24***
Total Sample	0,12***	0,32***	0,20***

Operating efficiency II. Revenue-expenditure ratio, t-tests

Operating efficiency III. Results

- For Revenue/Expenditure ratio:
  Private>Partially private>Public
- For Cost per WLU– qualitatively the same results (Non-public> public)
- For Revenue per WLU – difference is not statistically significant
- Vogel and Graham: Private airports > Public airports

	2000	2001	2002	2003	2004	Total sample
Not public	16,27	16,32	16,93	18,36	16,26	16,83
Public	13,48	13,58	13,55	14,49	15,19	14,06
Total Sample	14,99	15,07	15,38	16,59	15,77	15,56

Asset Utilization I. WLUs/Assets

Asset Utilization II. WLUs/Assets, t-tests

	Not Public minus Public
2000	2,80
2001	2,74
2002	3,38
2003	3,87
2004	1,07
Total Sample	2,77**

- For WLUs/Assets:
  Not public ≈ Public

- For Total Asset turnover:

Public ≈ Private > Partially privatized

- Vogel and Graham:
  Public > non-public

Asset Utilization III. Results

	2000	2001	2002	2003	2004	Total sample
Partially Privatized	8,50%	7,12%	7,79%	8,52%	9,30%	8,25%
Private	7,47%	8,82%	8,70%	7,33%	7,06%	7,88%
Public	4,85%	2,55%	2,67%	2,83%	1,68%	2,92%
Total Sample	6,21%	5,45%	5,52%	5,12%	4,49%	5,36%

Profitability I. ROA

	Private minus Partially Private	Private minus Public	Partially Private minus Public
2000	-1,03%	2,62%	3,65%
2001	1,70%	6,27%***	4,58%
2002	0,91%	6,03%**	5,12%
2003	-1,19%	4,50%	5,68%
2004	-2,24%	5.38%***	7,62%
Total Sample	-0,37%	4,96%***	5,33%***

Profitability II. ROA, t-tests

Profitability III. Results

- For ROA:
  Private ≈ Partially privatized > Public
- For ROCE:
  Private ≈ Partially privatized > Public
- Vogel and Graham: Private > Public

Further research

- Which time does it take to realize gains after privatization? Which method of privatization is better?
- More precise investigation of ownership structure
- Consider more closely partially privatized airports

Conclusion

- Private companies are better performers than public ones
- Does it apply to airports?
- FDH, DEA, PFP and FRA were used
- Private ? Partially privatized
- Non-public > Public
- Further research of ownership structure

Thank you very much for your attention!